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DEPARTMENT OF AGRONOMY

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# Analyses of West Virginia Soils

( Second Report )



BY

Robert M. Salter and Clarence F. Wells.

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† In co-operation with the University of Chicago.

\* In co-operation with the U. S. Department of Agriculture.

\*\* Leave of absence.

## CONCLUSIONS

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These Conclusions are Summarized from the Analyses of 240 Samples of West Virginia Soils

1.—The average West Virginia soil contains only 1100 pounds of phosphorus per acre to a depth of 6-2/3 inches. Fifty-five percent of the soils analyzed contain less than this amount. Numerous experiments show that the application of acid phosphate to such soils produces a marked increase in crop yields.

2.—Over forty percent of these soils contain less than 2500 pounds of nitrogen per acre to a depth of 6-2/3 inches. A more frequent use of legumes in the rotation is needed on such soils since they store up nitrogen from the air.

3.—More than eighty percent of the soils analyzed show a need of lime. Large yields of most crops, especially red clover and alfalfa, cannot be profitably obtained on sour soils. One ton of ground limestone per acre will correct the acidity of the average West Virginia soil.

4.—There is a close relation between the fertility of most soils and their content of organic matter. This constituent is greatly depleted in many soils of the State. Organic matter can be supplied by growing larger crops, and by plowing under cover crops, crop residues and manure.

5.—More than seventy-five percent of these soils contain more than 20,000 pounds of potassium per acre to plow depth. If the deficiencies in organic matter and lime were corrected, sufficient available potassium should be present to prevent its being a limiting factor.



# Analyses of West Virginia Soils\*

(Second Report)

By ROBERT M. SALTER and CLARENCE F. WELLS

A chemical study of the most important soil types of the state is being made by the division of soils of the department of agronomy of the West Virginia Agricultural Experiment Station. The most important soil types occurring in each county are being sampled and their content of total plant food elements determined. This bulletin is the second preliminary report and contains the analyses of the first two hundred and forty samples chosen. The first report has been published as West Virginia Agricultural Experiment Station Bulletin 161 entitled, "Analyses of One Hundred West Virginia Soils".

## SOIL SURVEYS OF THE UNITED STATES BUREAU OF SOILS

The United States Bureau of Soils has been co-operating with the West Virginia Geological Survey in its work in this state. As each area is surveyed as to its mineral content it is also mapped as to its soil types. It has seemed advisable to accept the soil classification as outlined by the Bureau of Soils and to choose our samples as largely as possible from areas which have already been surveyed. Up to the present time one-half of the state has been mapped. The soil surveys are issued under authorization of Congress and the distribution provides 500 copies of each soil survey in the state for each of the senators from the state and 2000 copies of each survey for the congressman representing the district in which the survey is located. Soil surveys are available for the following counties and can be obtained by writing to the senators or to the congressmen representing the various districts:

Boone	Kanawha	Monongalia	Taylor
Brooke	Lincoln	Ohio	Tyler
Cabell	Lewis	Pleasants	Upshur
Calhoun	Logan	Preston	Wayne
Doddridge	McDowell	Putnam	Wetzel
Gilmer	Marion	Raleigh	Wirt
Hancock	Marshall	Ritchie	Wood
Harrison	Mason	Roane	Wyoming
Jackson	Mingo		

\* For methods of analysis see Bulletin 159, West Virginia Agricultural Experiment Station, Morgantown.

Many of the soils, the analyses of which are given in this bulletin, have been chosen from the above named counties and represent definite soil types. Other samples have been chosen from areas which have not yet been surveyed and represent definite soil types which will be classified later when the soil survey of the state has been completed.

The Bureau of Soils\* has divided the United States into 13 soil provinces or regions. "A province is an area in which the soils have been produced by the same force or group of forces."

In West Virginia three provinces are represented.

- I. Limestone Valleys and Uplands Province.
- II. Appalachian Mountains and Plateaus Province.
- III. The River Flood Plains Province.

In each province there are several soil series. "A soil series is a group of soils having the same range in color, the same character of subsoil as regards color and structure, the same relief and drainage and a common or similar origin."

The following series are represented in West Virginia in the areas so far surveyed. This does not include the Eastern Panhandle or the soils of the types in Monroe, Greenbrier, and Pocahontas counties.

## I. LIMESTONE VALLEYS AND UPLANDS PROVINCE

### 1. Brooke series:

- a. Soils grayish brown to brown.
- b. Subsoils yellowish brown to reddish brown clay.
- c. Soils derived from pure limestone with occasional admixture of material from sandstone and shales.
- d. Soils with good drainage, fairly productive, easy to cultivate.

### 2. Hagerstown series (not surveyed as yet in West Virginia but present in limestone valley section of Greenbrier, Monroe, and Pocahontas and other eastern counties and in the Eastern Panhandle):

- a. Soils prevailing brown in color.
- b. Subsoils light brown to reddish brown.
- c. Soils derived from pure massive limestone.
- d. Soils very productive and suitable for most crops.

## II. APPALACHIAN MOUNTAINS AND PLATEAUS PROVINCE

### 1. Dekalb series:

- a. Soils gray to brown.
- b. Subsoils some shade of yellow.
- c. Soils derived from sandstone and shales.
- d. Soils generally not very productive (West Virginia Experiment Station farm in Dekalb soil).

\*U. S. Bureau of Soils, Bulletin 96.



## E R R A T A

- Page 17, line 13, "derrogatory" should read "derogatory."  
 line 21, "is" (first word in line) should read "are."
- Page 22, line 6 from foot of page, "operators" should read "operator."
- Page 24, Table IV, "Average,—\$1.43" should read "Average,—\$1.44."  
 2nd line below Table IV, "one cent" should read "two cents."
- Page 32, line 13 from foot of page, "invesement" should read "investment."
- Page 33, line 6 below Table XII, "tenants'" should read "tenants."
- Page 34, Table XIII, heading for last column, "\$2,500 and over" should read  
 "\$2,501 and over."
- Page 37, Table XIV, heading for last column, "\$2,500 and over" should read  
 "\$2,501 and over."
- Page 42, Table XX, heading, line 2, "hih" should read "his."
- Page 56, Table XXXVI, heading of last column, add footnote: "'Operator's  
 Total Cash Expense per Acre' comprises all cash expenses plus  
 family labor (except that of the operator) and depreciation."
- Page 57, Table XXXVII, same addition as for Table XXXVI.
- Page 69, last line, "68.8" should read "69.6"
- Page 78, section heading "Veil Stock" should read "Live Stock."
- Page 80, in section heading, "Yeild" should read "Yield."
- Page 95, lines 5 to 11 in Table LXXXII should read:

	I	II	III	IV
Crop Acres .....	84	86	87	86
Yield				
Corn (bushels) ...	35	50	80	40
Wheat (bushels)..	24	..	..	20
Rye .....	1½ T.	17 bu.	1¾ T.	..
Hay (tons) .....	1	1½	1¾	1
Potatoes (barrels).	80	80	77	70
Apples .....	..	..	..	..

- Page 101, line 12, "effect" should read "affect."  
 lines 16-19, paragraph should read "Owners making the highest  
 labor income have between \$20,000 and \$30,000 capital, tenants  
 between \$5000 and \$7000, and part owners \$15,000 to \$20,000."  
 line 21, omit "tween."  
 last line, "fars" should read "farms."

## B. FIRST BOTTOM SOILS

## 5. Holly series:

- a. Soils gray.
- b. Subsoils mottled gray and yellow.
- c. Contain some limestone.

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## II

- b. Subsoils some shade of yellow.
- c. Soils derived from sandstone and shales.
- d. Soils generally not very productive (West Virginia Experiment Station farm in Dekalb soil).

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\*U. S. Bureau of Soils, Bulletin 96.

2. **Meigs series:**
  - a. Soils variable in character from gray or pale yellow to red.
  - b. Subsoils variable.
  - c. Soils a mixture of Dekalb and Upshur.
  - d. Soils on hilly areas difficult to cultivate.
3. **Upshur series:**
  - a. Soils Indian red.
  - b. Subsoils Indian red.
  - c. Derived from sandstone and shales, frequently calcareous in nature.
  - d. Generally fairly productive.
4. **Westmoreland series:**
  - a. Soils grayish brown to yellowish brown.
  - b. Subsoils yellowish to yellowish brown.
  - c. Derived from sandstone and shales with interbedded limestone and calcareous shales.
  - d. Soils very productive.

### III. THE RIVER FLOOD PLAINS PROVINCE

#### A. TERRACE SOILS

1. **Elk series:**
  - a. Soils light brown to brown.
  - b. Yellow subsoils.
  - c. Soils contain limestone, alluvium from Westmoreland series.
  - d. Soils fairly productive.
2. **Holston series:**
  - a. Soils yellowish brown to brown.
  - b. Subsoils yellow.
  - c. Soils from sandstone and shale.
  - d. Only fairly productive.
3. **Tyler series:**
  - a. Soils gray to grayish brown.
  - b. Subsoils yellowish to mottled yellow and gray.
  - c. Soils largely from sandstone and shale, poorly drained.
  - d. Not very productive.
4. **Wheeling series:**
  - a. Soils brown to yellowish brown.
  - b. Subsoils gravelly.
  - c. Soils from glacial material.
  - d. Very productive.

#### B. FIRST BOTTOM SOILS

5. **Holly series:**
  - a. Soils gray.
  - b. Subsoils mottled gray and yellow.
  - c. Contain some limestone.

- d. Not very productive.
6. **Huntington series:**
- Soils light brown to brown.
  - Subsoils yellow to light brown.
  - Contain some limestone.
  - Very productive.
7. **Moshannon series:**
- Soils reddish brown to Indian red.
  - Subsoils reddish brown.
  - Soils from alluvium from Upshur series.
  - Very productive.
8. **Pope series:**
- Soils light brown to brown.
  - Subsoils yellow to brown.
  - Soils from alluvium from Dekalb series.
  - Very productive.

Table 1 shows the number of acres belonging to each series in the area so far surveyed.

**TABLE 1.—Acres of Land in Various Soil Series  
In West Virginia**

Series	Acres
Dekalb -----	3,314,514
Meigs -----	2,858,176
Rough Stony Land -----	838,016
Upshur -----	425,792
Huntington -----	360,576
Westmoreland -----	116,080
Holston -----	112,768
Moshannon -----	101,952
Tyler -----	57,664
Brooke -----	47,232
Wheeling -----	40,766
Elk -----	31,872
Holly -----	27,518
Pope -----	2,176
Miscellaneous -----	12,928
Total-----	8,348,030

In each of these soil series there are several soil types. "A soil type is a soil which throughout the area of its occurrence has the same texture, structure, color, character of subsoil, general topography, process of derivation, and usually derived from the same material." There may, therefore, be sands, silts, loams and clays in each of the above series. For example, the soil on the West Virginia Agricultural Experiment Station farm is a Dekalb silt loam.

TABLE II.—Arrangement of Soils According to County.

Sample Number	Owner of Farm	Postoffice	Soil Series	Nitrogen	Phosphorus	Potassium	Carbon	Limestone Requirement
Pounds per 2,000,000 lbs. of surface soil *								
<b>Barbour County</b>								
85-A	W. D. Zinn	Philippi	Tyler	3214	835	-18600	35510	1800
90-A	W. D. Zinn	Philippi	Westmoreland	4185	1236	27400	43910	3200
112-A	W. D. Zinn	Philippi	Upshur	4102	1236	49600	32210	1600
<b>Berkeley County</b>								
24-A	John Miller	Martinsburg		2358	1631	40600	19620	1000
25-A	John Miller	Martinsburg		2433	1420	51400	29120	1800
26-A	Back Creek Or. Co.	Hedgesville		1442	536	23800	22010	2400
27-A	Gray Silver	Martinsburg		2515	1150	40200	24960	1400
28-A	John Miller	Martinsburg		2081	2020	53800	15480	800
29-A	Mrs. Lupton	Martinsburg	Hagerstown	2235	1086	49000	23030	0
30-A	Mr. Aler	Martinsburg	Soapstone	2478	1398	39200	24960	1800
31-A	A. R. Felner	Martinsburg	Soapstone & Clay	1705	752	21600	20310	200
32-A	J. W. Stewart	Tabler		2152	1282	49600	21660	0
33-A	D. Gold Miller	Martinsburg		2296	917	108800	23950	1000
34-A	Dr. Shipper	Gerrardstown		2558	1322	31200	26110	3000
35-A	Geo. Shroades	Gerrardstown		2602	1364	39000	18150	2400
36-A	H. L. Smith	Arden		2932	1035	143000	31720	1800
37-A	Gr. Golden Or. Co.	Martinsburg		2486	1327	55000	27290	2200
38-A	Senator Silver	Gerrardstown	Hagerstown	3083	1117	52600	30480	0
199-A	F. Callahan	Martinsburg	Hagerstown	2630	1000	31080	37960	0
200-A	J. W. Small	Bedington	Hagerstown	2870	1640	27480	29960	0
201-A	J. W. Small	Bedington	?	3590	1020	28960	39400	0
202-A	A. R. Tabler	Martinsburg	Hagerstown	2360	880	73660	21920	0
203-A	A. R. Tabler	Martinsburg	Hagerstown	1670	610	57120	16800	900
204-A	Harry Whiting	Shepherdstown	Marl Soil	3770	1075	25340	42800	0
205-A	Flo. Ramsberg	Martinsburg	Hagerstown	2564	1315	101240	30000	0
206-A		Martinsburg	?	2024	848	160200	22040	0
207-A	Downey & Thompson	Jones Spring	?	2464	635	34240	28400	0
208-A	C. N. Stuckey	Jones Spring	?	2570	602	53400	23840	0
210-A	Wm. Sinten	Jones Spring	?	2724	690	22120	32320	0

\* This represents the amount of soil in a layer over an acre to a depth of 6-2/3 inches.

TABLE II (Continued).—Arrangement of Soils According to County

Sample Number	Owner of Farm	Postoffice	Soil Series	Pounds per 2,000,000 lbs. of surface soil				Limestone Requirement
				Nitrogen	Phosphorus	Potassium	Carbon	
<b>Brooke County</b>								
40-A	Robt. Underwood	Wellsburg	Huntington	5912	2648	38000	67010	3000
42-A	Robt. Patterson	Wellsburg	Brooke	3646	1365	48000	53010	0
111-A		Follansbee	Wheeling	1940	1550	21600	19375	3600
114-A	Wm. Brady	Collier	Dekalb	3060	1125	31200	30970	2800
<b>Cabell County</b>								
4-A	Mr. Wilson	Ona	Meigs	1375	588	26800	19170	4400
18-A	Mr. Clark	Ona	Upshur	2482	1218	49800	21620	0
21-A	Mr. Sios	Ona	Holston	1537	830	17600	15210	1400
22-A	C. R. Morris	Martha	?	2893	2066	56600	31760	1800
74-A	Perry Lawson	Milton	Dekalb	1520	370	17200	21210	1000
75-A	J. H. Moore	Milton	Holston (?)	4344	1187	35400	62970	0
79-A	Eld Kyle	Cox's Landing	Wheeling	1824	892	25600	17810	2000
84-A	John White	Culloden	Holston	1764	566	14400	20230	2200
<b>Doddridge County</b>								
113-A	J. E. Coleman	West Union	Holston (?)	3240	806	27800	34770	1800
<b>Fayette County</b>								
39-A	B. A. Fleshman	Fayetteville	Dekalb	1210	421	11000	25370	2200
58-A	L. V. Shawver	Corliss	Dekalb	3124	753	18400	48280	4600
61-A	T. C. Jones	Oak Hill	Dekalb	2082	483	16000	30550	2400
65-A	L. P. Wills	Mt. Cove	Dekalb	2602	662	11200	32450	2200
109-A	J. B. Kesler	Clifty	Dekalb	3384	660	20200	39490	2800
<b>Greenbrier County</b>								
44-A	L. E. McClung	Rupert	?	3116	1590	22000	54270	6800
45-A	J. O. McClung	Rupert	?	3680	708	17000	65800	4000
46-A	David Tuckwiller	Lewisburg	Soapstone	2824	1160	13800	28550	2600
47-A	Rev. H. A. Murrill	Lewisburg	Hagerstown (?)	2884	1289	27400	26560	1200
123-A	C. A. Jackson	Lewisburg	Upshur	1965	754	31400	19380	2200
124-A	C. A. Jackson	Lewisburg	?	1605	380	10160	24800	2300

## Greenbrier County (Cont'd.)

125-A	Mr. White	Lewisburg	?	2670	1287	15320	31800	2000	
126-A	J. D. Lites	Vago	Upshur	1900	665	34400	22800	2300	
127-A	J. D. Humphreys	Ronceverte	?	2645	827	9400	31800	100	
<b>Hardy County</b>									
230-A	W. S. Funkhouser	Moorefield	?	2940	1120	37920	37920	0	
231-A	Garrett Mathais	Mathais	?	1980	710	32620	18160	1400	
232-A	Garrett Mathais	Mathais	Dekalb	3070	817	31720	28600	1400	
233-A	Frank Snyder	Wardensville	?	10794	1430	26260	119600	0	
234-A	State Farm	Wardensville	?	1480	480	17280	17280	200	
235-A	State Farm	Wardensville	?	2170	750	18340	24640	200	
236-A	State Farm	Wardensville	?	5400	1273	25600	57200	2000	
237-A	H. Bosley	Moorefield	?	3904	1025	44080	38680	1000	
238-A	Arthur Cunningham	Moorefield	?	5395	1458	47720	54800	2600	

## Harrison County

1-A	Fred Whitman	Adamston	Westmoreland	2930	1226	42400	31330	2800
87-A	Arthur Sheets	Lost Creek	Dekalb	2750	706	22000	32140	3200
88-A	L. D. Blake	Lost Creek	Huntington	4324	1242	25000	43175	1800
91-A	A. H. Davidson	Lost Creek	Dekalb	4906	1219	22200	53090	1800
92-A	A. H. Davidson	Lost Creek	Dekalb	3142	902	25800	32140	1600
98-A	Arthur Sheets	Lost Creek	Elk	2534	706	17800	25690	2000
100-A	Jackson Arnold	Lost Creek	Huntington	5822	1362	27400	62360	3600
101-A	A. J. Lodge	Lost Creek	Huntington	6406	1858	32200	70130	2200
103-A	A. A. Long & Bro.	Bridgeport	Huntington	5046	1553	28000	48450	1200
104-A	S. S. Farris	Bridgeport	Dekalb	3046	784	22600	29180	2200
106-A	R. E. L. Stout	Bridgeport	Elk	3274	1376	23800	29630	200

## Jackson County

48-A	Mr. Bradbury	Sherman	?	2330	1226	32400	29020	5600
49-A	W. C. Statts	Sherman	Huntington	2016	864	19000	54990	0
50-A	W. C. Statts	Sherman	Huntington	1995	1091	24200	36360	0
51-A	Virgil Bower	Crow Summit	Moshannon	2152	1034	21600	22640	2400
52-A	Ruben Pickens	Ravenswood	Dekalb	2042	1216	26600	20280	2000
53-A	F. A. Morgan	Ravenswood	Moshannon	1670	874	25000	16580	2600
54-A	F. A. Morgan	Ravenswood	Moshannon	2144	973	24200	23860	1400
55-A	Isaac Starkey	Ravenswood	Holston	2164	739	19400	22970	0
56-A	M. F. Morgan	Ravenswood	Upshur	1755	546	20800	21090	2600

TABLE II (Continued).—Arrangement of Soils According to County

Sample Number	Owner of Farm	Postoffice	Soil Series	Pounds per 2,000,000 lbs. of surface soil				Limestone Requirement
				Nitrogen	Phosphorus	Potassium	Carbon	
<b>Jackson County (Cont'd.)</b>								
57-A	M. F. Morgan	Ravenswood	Holston	1035	354	21400	16730	2800
83-A	W. A. Proctor	Ravenswood	Wheeling	3784	3636	23400	45810	0
102-A	Chas. Kalt	Crow Summit	Moshannon	2430	862	24800	16180	1800
<b>Jefferson County</b>								
5-A	C. D. Wyszog	Shepherdstown	Hagerstown	2336	1218	51000	27150	0
209-A	Wm. Ryder	Halltown	?	2224	1080	80300	20960	0
211-A	N. T. Snyder	Shenandoah Jet.	Hagerstown	3594	3033	100840	40400	0
212-A	Ed Jarrett	Shepherdstown	Hagerstown	2060	913	96800	21760	200
213-A	Geo. M. Knott	Shepherdstown	?	2430	950	62360	22040	0
214-A		Bakerton	?	2270	1995	38280	24800	0
215-A	Chas. Dailey	Harpers' Ferry	?	2064	480	47220	26040	3000
216-A	Rolf Gearhardt	Charlestown	?	2640	1090	110940	27160	1000
217-A	Harvey McDonald	Summit Point	Hagerstown	2360	903	58500	25840	0
218-A	I. S. Carr	Middleway	?	4080	1095	38420	40800	0
<b>Kanawha County</b>								
43-A	E. C. Crane	Poca	Holston (?)	3322	1529	37200	31850	3200
107-A	Lewis Milam	Charleston	Dekalb	2610	653	25800	28780	2000
108-A	W. A. Lawson	Charleston	Dekalb	2224	434	16600	30580	1600
110-A	Geo. Johnson	Charleston	Holston	1890	715	10100	18020	2000
<b>Marion County</b>								
81-A	County Poor Farm	Fairmont	Westmoreland	2746	1020	35600	27260	2400
86-A	Mr. Meredith	Fairmont	Huntington (?)	3846	1119	27400	41380	3800
89-A	J. S. Nuzum	Colfax	Westmoreland	4076	1526	34800	37310	2000
95-A	J. F. Phillips	Fairmont	Elk	3280	997	23000	36220	0
96-A	L. N. Beatty	Mannington	Moshannon	3444	1226	32600	30470	3800
99-A	W. F. Boyers	Fairmont	Elk	2744	839	23200	26950	2000





TABLE II (Continued).—Arrangement of Soils According to County

Sample Number	Owner of Farm	Postoffice	Soil Series	Pounds per 2,000,000 lbs. of surface soil				Limestone Requirement
				Nitrogen	Phosphorus	Potassium	Carbon	
<b>Morgan County</b>								
10-A	Mr. Henry	Stotlers Cross R.	Dekalb (?)	2272	891	18000	29000	2400
11-A	Mr. Henry	Stotlers Cross R.	Upshur (?)	3517	621	19000	16690	800
17-A	Somer's Orchard	Cherry Run	Dekalb (?)	2331	798	30200	38080	4000
19-A	Somer's Orchard	Cherry Run	Dekalb (?)	2357	925	29600	31400	1200
219-A	E. VanRensselaer	Berkeley Springs	?	2660	540	38600	28760	0
220-A	Hollis Henry	Berkeley Springs	?	2020	863	26320	30480	0
221-A	E. VanRensselaer	Berkeley Springs	?	3654	1370	44840	41600	0
222-A	Mrs. Geo. Allen	Berkeley Springs	?	3140	678	25240	55200	1900
223-A	J. W. Hovernale	Berkeley Springs	?	2900	806	27220	29200	0
224-A	J. W. Grove	Berkeley Springs	?	1890	695	33840	21840	0
225-A	Wm. Groves	Berkeley Springs	?	2150	533	29340	24320	0
226-A	Sleepy Creek							
	Orchard Co.							
227-A	C. F. Miller	Berkeley Springs	?	2110	608	22840	27600	800
228-A		Cherry Run	?	3680	1860	41560	35000	2400
229-A	Sleepy Creek	Cherry Run	?	2910	1013	35900	40800	1900
	Orchard Co.							
		Berkeley Springs	Upshur (?)	1550	648	30120	16640	0
<b>Nicholas County</b>								
41-A	E. P. Foster	Gauley Bridge	?	2135	----	1200	38630	5000
147-A	O. H. Odell	Nettie	Dekalb	5050	1210	24600	70600	4100
148-A	R. W. Sawyer	Canvas	Dekalb	2680	567	18520	38600	3900
149-A	N. T. Nutter	Persinger	?	5620	1070	21000	67200	6100
150-A	A. C. Dorsey	Mt. Lookout	Dekalb	2740	510	13500	42200	2000
151-A	A. Austin Bryant	Summersville	Dekalb	3330	930	24600	41200	3200
152-A	K. B. McCue	Muddlety	?	4890	1144	29800	56200	6300
153-A	D. T. Callahan	Craigsville	Dekalb	3110	839	34200	44200	4200
<b>Ohio County</b>								
168-A	F. Burkle	Wheeling	Huntington	4560	2165	14480	78600	200
169-A	J. W. Supler	Triadelphia	Dekalb	2330	1530	16600	22800	2300

## Ohio County (Cont'd.)

170-A	Elm Grove	Huntington	3285	2105	17500	36200	1900
171-A	Wheeling	Dekalb	3890	1879	17440	40200	6700
172-A	Short Creek	Brooke	4295	1535	17060	40200	3000
<b>Pendleton County</b>							
190-A	A. C. Boggs & Son	?	3444	1662	38399	32880	1200
191-A	C. A. Hedrick	?	1630	508	30500	22600	1300
192-A	Jacob Harman	Hagerstown	3820	1045	47500	40400	0
193-A	J. F. Bennett	?	874	438	30000	3560	2300
194-A	Herbert Anderson	?	3054	1072	28820	3136	0
195-A	Geo. F. Mitchell	?	1680	488	15180	27160	3800
196-A	J. F. Trumbo	Dekalb (?)	2090	705	28300	19480	2800
197-A	S. B. McClung	?	5994	2003	35140	67600	2800
198-A	O. R. Mallow	?	3280	1333	40860	33776	400

## Pleasants County

6-A	J. B. Kester	Wheeling	3423	2248	23000	38460	3000
180-A	E. R. Smith	Upshur	2335	947	30000	28600	2100
181-A	G. W. Bills	Wheeling	1440	1694	15700	15300	2100
182-A	S. W. Bills	Huntington	2560	1147	26000	28200	2300
183-A	G. K. Ruttencutter	Tyler	2340	662	20000	24000	2100
184-A	G. K. Ruttencutter	Meigs	3800	1042	31200	37800	1300
185-A	J. R. Harman	Dekalb	1930	470	21600	20600	3200
186-A	County Farm	Wheeling	3220	2114	25200	35800	1700
187-A	County Farm	Meigs	3170	1145	38200	31200	0

## Pocahontas County

116-A	J. S. McNeal	Hillsboro	3420	1025	24600	36400	2700
117-A	J. E. Moore	Huntersville	3235	1485	25600	32200	3300
118-A	J. A. Young	Marlinton	2325	705	15000	33200	3100
119-A	W. G. Cochran	Onoto	4230	1610	17120	46600	4900
120-A	W. G. Cochran	Dekalb	3960	1339	11380	53200	5200
121-A	W. G. Cochran	Hagerstown	5505	1570	26800	62800	200
122-A	Uriah Hevner	?	5495	1667	24200	56000	5400

TABLE II (Continued).—Arrangement of Soils According to County

Sample Number	Owner of Farm	Postoffice	Soil Series	Pounds per 2,000,000 lbs. of surface soil					Limestone Requirement
				Nitrogen	Phosphorus	Potassium	Carbon		
<b>Preston County</b>									
66-A	A. M. McMillen	Masontown	Dekalb	3374	697	20000	47230	1400	
67-A	Sanford Watson	Masontown	Dekalb	4326	2159	26000	47320	1600	
68-A	B. T. Gibson	Masontown	Holly	3984	923	24600	45700	1600	
69-A	J. F. Copeman	Kingwood	Dekalb (?)	4746	2146	31000	49230	1400	
70-A	County Farm	Kingwood	Dekalb	3870	1203	27000	41420	400	
71-A	T. B. Taylor	Terra Alta	Upshur	2986	761	25600	37250	0	
72-A	J. A. Dodge	Terra Alta	Dekalb	4142	1135	23400	48680	2600	
188-A	D. C. Stemple	Aurora	Dekalb	5070	1387	15180	67800	1200	
189-A	D. C. Stemple	Aurora	Dekalb	4950	835	12860	70400	4800	
<b>Ritchie County</b>									
60-A	J. F. Lowther	Pullman	Upshur	2802	728	34800	26820	5000	
<b>Roane County</b>									
97-A	C. C. Hardman	Spencer	Dekalb	2132	482	27400	22880	2200	
<b>Summers County</b>									
139-A	J. Grimmett	Buck	?	2600	867	19040	23600	2500	
140-A	T. G. C. Grimmett	Buck	Upshur	2375	570	19360	22200	3000	
141-A	C. E. Saunders	Forest Hill	Dekalb	1245	374	4960	21800	2100	
142-A	J. W. Ferrell	Forest Hill	?	1825	617	17620	17800	3000	
143-A	E. L. Saunders	Forest Hill	Dekalb	1080	369	11460	12380	1500	
144-A	W. C. Anderson	Jumping Branch	Dekalb	1800	387	10360	29400	2200	
145-A	Dr. J. B. McCommas	Jumping Branch	Dekalb	1835	462	7780	26200	3500	
146-A	A. H. Mann	Jumping Branch	Dekalb	2000	394	7080	36800	1600	
<b>Taylor County</b>									
3-A	G. Smith	Flemington	Huntington	4268	1603	32400	57590	2400	
14-A	F. B. Haller	Rosemont	Westmoreland	2954	1181	25000	34360	3000	
15-A	M. G. Lawson	Flemington	Elk	3699	1213	22000	40400	3400	

<b>Tyler County</b>									
154-A	County Farm	Middlebourne	Huntington	3420	1305	41200	32800	4000	
155-A	J. W. Smith	Frew	Meigs	2435	632	32600	27800	3500	
156-A	Timothy Smith	Frew	Dekalb	3080	794	25800	30200	2700	
157-A	Everett Archer	Middlebourne	Dekalb	2250	687	26600	22200	2000	
158-A	Arthur Thomas	Middlebourne	Upshur	2190	625	25200	23200	1400	
159-A	B. F. Kile	Next	Tyler	3165	635	20800	33400	700	
160-A	J. R. Wells	Bens Run	Wheeling	3515	2040	25000	35000	2000	
<b>Wayne County</b>									
12-A	W. J. Smith	Centerville	Holston	2299	806	21200	26170	1200	
13-A	W. F. Plymale	Centerville	Holston	3385	1148	33600	34280	3400	
<b>Wetzel County</b>									
173-A	A. F. Cochran	New Martinsville	Wheeling	4400	3195	15700	54000	4000	
174-A	J. D. Morgan	Steelton	Wheeling	2430	1540	18780	25000	3000	
175-A	T. H. Cornett	Steelton	Meigs	2310	992	17300	24000	2500	
176-A	Evan Williams	New Martinsville	Huntington	2400	1536	18600	69200	0	
177-A	Wise Estate	New Martinsville	Tyler	2445	777	21000	23600	3500	
178-A	Clark Leap	New Martinsville	Dekalb	2830	874	21200	30200	2300	
179-A	R. M. Whiteman	New Martinsville	Meigs	3630	2077	29000	36200	1700	
<b>Wood County</b>									
7-A	Mr. Creel	Davisville	Tyler	2680	1163	25200	27450	3400	
8-A	J. A. Creel	Davisville	Upshur	2551	950	37600	25900	5200	
9-A	J. A. Creel	Davisville	Dekalb	1669	680	26200	17601	1200	
59-A	J. F. Doan	Parkersburg	Upshur	2077	630	36400	18350	6400	
62-A	J. W. Miller	Mineral Wells	Huntington	1550	782	18400	14150	800	
63-A	F. J. Humphrey	Belleville	Huntington	2724	1457	14200	33680	800	
64-A	A. F. Bonar	Belleville	Brooke	3004	1543	40200	30120	0	
73-A	I. G. Butcher	Mineral Wells	Huntington	1970	918	34200	16490	2400	
77-A	Mr. Barnett	Davisville	Tyler	3910	1108	34800	41380	5200	
93-A	S. F. Romine	Washington	Dekalb	1904	586	22200	21790	1000	
94-A	Dr. Keefer	Belleville	Wheeling	3496	1563	26200	31480	1400	

TABLE III.—Arrangement of Soils According to Series \*

Sample Number	County	Pounds per 2,000,000 lbs. Surface Soil				Limestone Requirement
		Nitrogen	Phosphorus	Potassium	Carbon	
<b>Brooke Series</b>						
42	Brooke	3646	1365	48000	53010	0
172	Ohio	4295	1535	17060	40200	3000
64	Wood	3004	1543	40200	30120	0
Average		3652	1481	35086	41110	1000
<b>Dekalb Series</b>						
147	Nicholas	5050	1210	24600	70600	4100
189	Preston	4950	835	12860	70400	4800
188	Preston	5070	1387	15180	67800	1200
120	Pocahontas	3960	1339	11380	53200	5200
91	Harrison	4906	1219	22200	53090	1800
69	Preston	4746	2146	31000	49230	1400
166	Marshall	2880	1687	16900	48800	3700
72	Preston	4142	1135	23400	48680	2600
58	Fayette	3124	753	18400	48280	4600
67	Preston	4326	2159	26000	47320	1600
66	Preston	3374	697	20000	47230	1400
153	Nicholas	3110	839	34200	44200	4200
150	Nicholas	2740	510	13500	42200	2000
70	Preston	3870	1203	27000	47420	400
151	Nicholas	3330	930	24600	41200	3200
171	Ohio	3890	1879	17440	40200	6700
109	Fayette	3384	660	20200	39490	2800
148	Nicholas	2680	567	18520	33600	3900
17	Morgan	2331	798	30200	38080	4000
146	Summers	2000	394	7080	36800	1600
65	Fayette	2602	662	11200	32450	2200
92	Harrison	3142	902	25800	32140	1600
87	Harrison	2750	706	22000	32140	3200
19	Morgan	2357	925	29600	31400	1200
114	Brooke	3060	1125	31200	30970	2800
108	Kanawha	2224	434	16600	30580	1600
61	Fayette	2082	483	16000	30550	2400
178	Wetzel	2830	874	21200	30200	2300
156	Tyler	3080	794	25800	30200	2700
144	Summers	1800	387	10360	29400	2200
104	Harrison	3046	784	22600	29180	2200
10	Morgan	2272	891	18000	29000	2400
107	Kanawha	2610	653	25800	28780	2000
232	Hardy	3070	817	31720	28600	1400
131	Monroe	1830	540	9000	26400	2000
145	Summers	1835	462	7780	26200	3500
133	Monroe	3755	477	11840	26100	2100
39	Fayette	1210	421	11000	25370	2200
137	Monroe	1565	275	5720	24200	2600
16	Monongalia	2058	718	26000	23140	3000
2	Monongalia	2225	698	28400	22900	3000
97	Roane	2132	482	27400	22880	2200
169	Ohio	2330	1530	1660	22800	2300
163	Marshall	2115	1430	24800	22200	2100
157	Tyler	2250	687	26600	22200	2000

\* Soils arranged according to their content of organic carbon which may be taken as a rough measure of their relative fertility.

TABLE III (Continued).—Arrangement of Soils According to Series

Sample Number	County	Pounds per 2,000,000 lbs. Surface Soil				Limestone Requirement
		Nitrogen	Phosphorus	Potassium	Carbon	
141	Summers	1245	374	4960	21800	2100
93	Wood	1904	586	22200	21790	1000
74	Cabell	1520	370	17200	21210	1000
185	Pleasants	1930	470	21600	20600	3200
52	Jackson	2042	1216	26600	20280	2000
196	Pendleton	2090	705	28300	19480	2800
9	Wood	1669	680	26200	17601	1200
143	Summers	1080	369	11460	12380	1500
Average		2755	854	19922	34188	2513
<b>Elk Series</b>						
15	Taylor	3699	1213	22000	40400	3400
95	Marion	3280	997	23000	36220	0
106	Harrison	3274	1376	23800	29630	200
99	Marion	2744	839	23200	26950	2000
98	Marion	2534	706	17800	25690	2000
Average		3106	1026	21960	31778	1520
<b>Hagerstown Series</b>						
121	Pocahontas	5505	1570	26800	62800	200
136	Monroe	4065	1372	14800	42600	400
211	Jefferson	3594	3033	100840	40400	0
192	Pendleton	3820	1045	47500	40400	0
199	Berkeley	2630	1000	31080	37960	0
135	Monroe	3080	1517	13260	33200	1100
38	Berkeley	3083	1117	52600	30480	0
205	Berkeley	2564	1315	101240	30000	0
200	Berkeley	2870	1640	27480	29960	0
5	Jefferson	2336	1218	51000	27150	0
47	Greenbrier	2884	1289	27400	26560	1200
138	Monroe	2013	1077	18980	26400	1900
217	Jefferson	2360	903	58500	25840	0
29	Berkeley	2235	1080	49000	23030	0
202	Berkeley	2360	880	73660	21920	0
212	Jefferson	2066	913	96800	21760	200
32	Berkeley	2152	1282	49600	21660	0
203	Berkeley	1670	610	57120	16800	900
Average		2832	1264	49870	31051	328
<b>Holston Series</b>						
75	Cabell	4344	1187	35400	62970	0
13	Wayne	3385	1148	33600	34280	3400
43	Kanawha	3322	1529	37200	31850	3200
12	Wayne	2299	806	21200	26170	1200
113	Doddridge	3240	806	27800	24770	1800
55	Jackson	2164	739	19400	22970	0
84	Cabell	1764	366	14400	20230	2200
110	Kanawha	1890	715	10100	18020	2000
57	Jackson	1035	354	21400	16730	2800
76	Mason	1615	649	22600	15490	1600
21	Cabell	1537	830	17600	15210	1400
Average		2417	847	22791	26244	1963

TABLE III (Continued).—Arrangement of Soils According to Series

Sample Number	County	Pounds per 2,000,000 lbs. Surface Soil				Limestone Requirement
		Nitrogen	Phosphorus	Potassium	Carbon	
<b>Holly Series</b>						
	Preston	3984	923	24600	45700	1600
<b>Huntington Series</b>						
161	Marshall	3645	1393	27800	79000	800
168	Ohio	4560	2165	14480	78600	300
101	Harrison	6406	1853	32200	70130	2200
176	Wetzel	2400	1536	18600	69200	0
40	Brooke	5912	2648	38000	67010	3000
164	Marshall	2730	1092	17120	63600	0
100	Harrison	5822	1362	27400	62360	3600
3	Taylor	4268	1603	32400	57590	2400
49	Jackson	2016	864	19000	54990	0
103	Harrison	5046	1553	28000	48450	1200
88	Harrison	4324	1242	25000	43175	1800
86	Marion	3846	1119	27400	41380	3800
50	Jackson	1995	1091	24200	36360	0
170	Ohio	3285	2105	17500	36200	1900
63	Wood	2724	1457	14200	33680	800
154	Tyler	3420	1305	41200	32800	4000
80	Mason	2975	1557	22600	30050	2200
182	Pleasants	2560	1147	26000	28200	2300
73	Wood	1970	918	34200	16490	2400
62	Wood	1550	782	18400	14150	800
Average		3573	1439	25285	48434	1660
<b>Meigs Series</b>						
184	Pleasants	3800	1042	31200	37800	1300
179	Wetzel	3630	2077	29000	36200	1700
187	Pleasants	3170	1145	38200	31200	0
155	Tyler	2435	632	32600	27800	3800
167	Marshall	2940	1820	15700	25200	2500
175	Wetzel	2310	992	17300	24000	2500
4	Cabell	1375	588	26800	19170	4400
Average		2666	1185	20919	28767	2271
<b>Moshannon Series</b>						
78	Mason	3316	712	39000	31700	5200
96	Marion	3444	1226	32600	30470	3800
54	Jackson	2144	973	24200	23860	1400
51	Jackson	2152	1034	21600	22640	2400
53	Jackson	1670	874	25000	16580	2600
102	Jackson	2430	862	24800	16180	1800
Average		2526	947	27866	23572	2866
<b>Tyler Series</b>						
77	Wood	3910	1108	34800	41380	5200
85	Barbour	3214	835	18600	35510	1800
159	Tyler	3165	635	20800	33400	700
177	Wetzel	2445	777	21200	30200	2300
7	Wood	2680	1163	25200	27450	3400
183	Pleasants	2340	662	20000	24000	2100
Average		2959	863	23433	31990	2583



TABLE III (Continued).—Arrangement of Soils According to Series

Sample Number	County	Pounds per 2,000,000 lbs. Surface Soil				Limestone Requirement
		Nitrogen	Phosphorus	Potassium	Carbon	
<b>Upshur Series</b>						
71	Preston	2986	761	25600	37250	0
112	Barbour	4102	1236	49600	32210	1600
180	Pleasants	2335	947	30000	28600	2100
60	Ritchie	2808	728	34800	26820	5000
132	Monroe	2240	957	32000	26400	1200
130	Monroe	2680	560	69940	26400	2100
8	Wood	2551	950	37600	25900	5200
158	Tyler	2190	625	25200	23200	1400
126	Greenbrier	1900	665	34400	22800	2300
140	Summers	2375	570	19360	22200	3000
18	Cabell	2482	1218	49800	21620	0
56	Jackson	1755	546	20800	21090	2600
82	Mason	1760	425	39000	20990	3800
123	Greenbrier	1965	754	31400	19380	2200
59	Wood	2077	630	36400	18350	6400
11	Morgan	3715	626	19000	16690	800
229	Morgan	1550	648	30120	16640	0
Average		2439	813	34413	23906	2335
<b>Westmoreland Series</b>						
23	Monongalia	6821	1630	30800	77210	2000
90	Barbour	4185	1236	27400	43910	3200
14	Taylor	2954	1181	25000	34360	3000
1	Harrison	2930	1226	42400	31330	2800
89	Marion	4076	1526	34800	37310	2000
81	Marion	2746	1020	35600	27260	2400
Average		3952	1303	32666	46702	2566
<b>Wheeling Series</b>						
83	Jackson	3784	3636	23400	45810	0
173	Wetzel	4400	3195	15700	54000	4000
165	Marshall	3800	2104	16600	40200	2800
6	Pleasants	3423	2248	23000	38460	3000
186	Pleasants	3220	2114	25200	35800	1700
160	Tyler	3515	2040	25000	35000	700
162	Marshall	2900	3475	15120	34600	1500
94	Wood	3496	1563	26200	31480	1400
174	Wetzel	2430	1540	18780	25000	3000
79	Cabell	1824	892	25600	17810	2000
181	Pleasants	1440	1694	15700	15300	2100
111	Brooke	1940	1550	21600	19375	3600
Average		3014	2171	20992	33860	2151
State Average		2955	1103	28234	33477	1953

## HISTORY OF SOIL SAMPLES\*

**No. 116A.**—Soil, red to brown; subsoil, red; original timber, white oak, sugar and black walnut; land, rolling terrace; natural drainage; crop rotation: corn, wheat, clover, timothy; average yield of corn per acre, 40 bushels; 6 loads of manure per acre to corn; 100 lbs. acid phosphate applied; red clover does fairly well.

**No. 117A.**—Soil, gray to brown; subsoil, brown; cornfield north of barn; original timber: white pine, white oak, chestnut, hemlock; level first terrace; natural drainage but needs some tile; rotation: corn, wheat, clover, timothy; corn, 45 bushels; wheat, 15 bushels; manure, 4 loads per acre to corn; 200 lbs. acid phosphate to corn; soybeans do well; red clover does well.

**No. 118A.**—Soil, red to brown; subsoil, light reddish brown; rolling highland; field southeast of barn; original timber, white oak and black pine; natural drainage; rotation: corn, wheat, clover, timothy; 300 lbs. acid phosphate in 1916 and 300 lbs. mixed fertilizers previously; red clover does well; weeds, sorrel, joint grass, yarrow.

**No. 119A.**—Soil, chocolate; subsoil, reddish brown; rolling terrace; natural drainage; cleared 100 years; rotation: corn, wheat, clover, timothy; manure, 4 tons per acre each year; 150 lbs. acid phosphate 1916; 300 lbs. complete fertilizer previously; red clover does well; weeds, joint grass and yarrow.

**No. 120A.**—Soil, yellowish brown; subsoil, brown; rolling highland; cleared 100 years; located at foot of hill; grass field; rotation: clover, timothy; poor yield; manure, 4 tons per acre per year; considerable acid phosphate and complete fertilizer; two soy bean crops grown and plowed under; red clover does not do well; weeds, cinque foil and yarrow.

**No. 121A.**—Soil, dark brown; subsoil, light brown; rolling highland; cleared 100 years; located at foot of hill, grass field; rotation: corn, wheat, clover, timothy; fair yield of crops; manure, 4 tons per acre; some acid phosphate and complete fertilizer applied; red clover does well; weeds, yarrow.

**No. 122A.**—Soil, dark brown; subsoil, light brown; level bottom land; drainage, natural; grass field west of creek; cleared 100 years; timber, white oak, pine; rotation: corn, oats, wheat, clover; good yield; manure, 4 loads every two years; 500 lbs. acid phosphate; limed 20 years previous; alfalfa does well; red clover does fairly well.

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\*For history of first 115 samples analyzed see West Virginia Agricultural Experiment Station Bulletin 161.

**No. 123A.**—Soil, chocolate; subsoil, red; rolling highland; drainage, natural; corn field across road from house; cleared 100 years; original timber, white oak, chestnut; rotation: corn, wheat, clover, timothy; good crops; 200 lbs. acid phosphate applied on corn; red clover does fairly well.

**No. 124A.**—Soil, brown; subsoil, light brown; rolling terrace; drainage, natural; corn field across road from house; cleared 100 years; white oak, chestnut; rotation: corn, wheat, clover, timothy; yield low; 200 lbs. acid phosphate 1916; red clover does fairly well.

**No. 125A.**—Soil, brown; subsoil, brown; drainage, natural; level highland; corn field along road; yields good.

**No. 126A.**—Soil, chocolate red; subsoil, red; rolling highland; drainage, natural; original timber, oak, chestnut; wheat field below store; rotation: corn, wheat, clover, grass; grass yield fair; 200 lbs. acid phosphate 1916, complete fertilizer previously; red clover does well.

**No. 127A.**—Soil, dark brown; subsoil, brown; rolling highland; drainage, natural; corn field south of house; cleared 100 years; white oak and chestnut; rotation: corn, clover sown in last cultivation of corn; crops, excellent; manure, regularly; 300 lbs. acid phosphate 1916; limed 30 years ago; red clover does well.

**No. 128A.**—Soil, gray to yellow; subsoil, yellow; rolling highland; drainage, natural; hill above house; yield low; red clover does not do well.

**No. 129A.**—Soil, red to brown; subsoil, red; rolling highland; corn field across road from house; cleared 100 years; original timber, white oak, chestnut oak; drainage, natural; rotation: corn, wheat, clover, timothy; yield, good; manure, 6 loads per acre; acid phosphate 300 lbs. applied; red clover does well.

**No. 130A.**—Soil, brown; subsoil, yellow; level terrace; drainage, natural; cleared 100 years; corn field in creek bottom; original timber, white oak, chestnut, and locust; rotation: corn, wheat, clover, timothy; excellent clover; manure applied; 250 lbs. acid phosphate on wheat; 2 tons ground limestone on wheat; red clover does well.

**No. 131A.**—Soil, gray; subsoil, light gray; rolling terrace; drainage, natural; grass field south of house; original timber, white oak and yellow pine; rotation: corn, wheat, clover, timothy; crops fair; some manure applied; 200 lbs. acid phosphate per acre on corn and wheat for 15-20 years; 2 tons of marl per acre; red clover, poor.

**No. 132A.**—Soil red; subsoil, red; rolling highland; drainage; corn field south and back of house; cleared 30 years; original timber, white oak and yellow pine; rotation: corn, wheat, clover, timothy; crops fair; some manure applied; 200 lbs. acid phosphate on corn and wheat for 15 years; poor clover.

**No. 133A.**—Soil, light gray; subsoil, gray to yellow; fairly level; highland; natural drainage; clover field back of house; cleared 50 years; original timber, white oak, yellow pine, chestnut; rotation: corn, wheat, clover, timothy; fair crops; some manure applied; 150 lbs. 1-10-2 fertilizer on corn and wheat for several years; fair clover; weeds, cinquefoil, sheep sorrel.

**No. 134A.**—Soil, brown; subsoil, light brown; rolling highland; fair crops.

**No. 135A.**—Soil, brown; subsoil, light brown; level terrace; drainage, natural; crops good; field along lane.

**No. 136A.**—Soil, brown; subsoil, light brown; limestone out-crops; rolling highland; drainage natural; pasture across from house; cleared 40 years; original timber, black walnut, poplar, white oak, beech, locust; pasture 12 years; principal grasses, blue grass, timothy, white clover; red clover does well.

**No. 137A.**—Soil, brown; subsoil, light brown; rolling highland; drainage, natural; wheat field across pasture from house; cleared 20 years; original timber, chestnut, walnut, white oak; rotation: corn, wheat, red clover, timothy; yields poor; some manure applied; 200 lbs. of complete fertilizer applied; poor red clover.

**No. 138A.**—Soil, brown; subsoil, light brown; drainage natural; good crops; red clover does well.

**No. 139A.**—Soil, chocolate brown; subsoil, chocolate; level lowland; drainage, natural; corn field back of church; cleared 75 years; original timber, white oak and chestnut; rotation: corn, oats or wheat, clover, timothy; crops fair; some manure 1916; 150 lbs. fertilizer on wheat; red clover fair.

**No. 140A.**—Soil, chocolate; subsoil, chocolate; rolling highland; drainage, natural; wheat field on top of hill; cleared 75 years; original timber, white oak, chestnut, locust, black pine; rotation: corn, wheat, clover, timothy; crops fair; 150 lbs. complete fertilizer on wheat, 100 lbs. on corn; red clover, poor.

**No. 141A.**—Soil, brown; subsoil, red and yellow; highland; natural drainage; east field of farm; cleared 25 years; original timber, chestnut; rotation: corn, wheat, clover, grass; medium crops yield; some manure 3 and 6 years ago; 100 lbs. acid phosphate on corn and 150 lbs. on wheat; cowpeas 6 years ago, nodules but no inoculation; red clover fair; sorrel principal weed.

**No. 142A.**—Soil, brown; subsoil, brown to red; corn field south of house; cleared 100 years; rotation: corn, wheat, clover, grass; some fertilizer; red clover poor.

**No. 143A.**—Soil, brown; subsoil, chocolate; clover field western part of farm; cleared 40 years; original timber, chestnut; rotation: corn, wheat, clover or cowpeas; manure, light application every three years; 200-300 lbs. acid phosphate and potash on wheat several times; soy beans and cowpeas do fairly well; red clover poor; sheep sorrel principal weed.

**No. 144A.**—Soil, brown; subsoil, light brown; fairly level highland; drainage, natural but poor; millet and grass southeast of house; original timber, oak, chestnut and locust; crops poor; 100 lbs. fertilizer on wheat and oats, 200 lbs. acid phosphate on corn; red clover poor.

**No. 145A.**—Soil, yellow to brown; subsoil, yellow; level highland; drainage, natural but poor; buckwheat by road; cleared 75 years; original timber, chestnut, white oak and hickory; rotation: buckwheat, wheat; low yield; 200 lbs. acid phosphate on wheat and buckwheat; red clover, poor; cinquefoil, sheep sorrel and broomsedge principal weeds.

**No. 146A.**—Soil, brown; subsoil, yellow; level highland; drainage, natural; buckwheat field northwest of house; original timber, chestnut, white oak; rotation: buckwheat, crimson clover, corn, crimson clover, corn, crimson clover; crops fair; some manure on part of field; 175 lbs. of 14% acid phosphate on buckwheat; 900 lbs. burned lime on 4 acres; red clover poor; sheep sorrel and cinquefoil, principal weeds.

**No. 147A.**—Soil, brown; subsoil, yellow; rolling highland; drainage, natural; soy bean field back of store; cleared 30 years; rotation: corn, soy beans, wheat; 300 lbs. acid phosphate applied; soy beans good; inoculated; red clover medium; original timber, chestnut, white oak.

**No. 148A.**—Soil, gray; subsoil, yellow; level highland; drainage, natural but poor; grass field back of house; cleared 100 years; original timber, chestnut and white oak; low yield; grass for several years; blue grass, red top and broomsedge; red clover, poor; cinquefoil, broomsedge, principal weeds.

**No. 149A.**—Soil, black; subsoil, light brown; level terrace; drainage, poor; grass field west of house; cleared 20 years; original timber, white oak; timothy, red top, wild swamp grass.

**No. 150A.**—Soil, brown; subsoil, yellow; level highland; drainage, natural; rotation: grass, buckwheat and corn; corn field south west of barn; cleared 18 years; original timber, chestnut and poplar; crops poor; 200 lbs. acid phosphate applied; soy beans do well; red clover, fair.

**No. 151A.**—Soil, brown; subsoil, yellow; rolling terrace; drainage, natural; grass field north of creek; cleared 75 years; original timber, chestnut, poplar and oak; rotation: corn, oats, wheat and grass; crops fair; some manure applied; 200 lbs. acid phosphate on corn and wheat; soy beans and crimson clover do well; red clover, good.

**No. 152A.**—Soil, black; subsoil, gray; drainage, natural but poor; grass field south of road; meadow; cleared 50 years; red clover, none.

**No. 153A.**—Soil, gray; subsoil, yellow; rolling highland; drainage, natural; original timber, oak and chestnut; pasture, second field north of house; red top and wild grasses; red clover, poor unless limed.

**No. 154A.**—Soil, reddish brown; subsoil, same; level terrace; drainage, natural; soy bean field north of buildings; original timber, poplar, walnut, hickory, oak and chestnut; rotation: corn (crimson clover) soy beans; crops good; some acid phosphate applied, soy beans do well; no inoculation; red clover, fair.

**No. 155A.**—Soil, brown; subsoil, reddish brown; rolling highland; drainage, natural; field north east of house (corn); original timber, hickory, chestnut, locust, poplar; rotation: corn, corn, corn, (crimson clover); red clover, poor.

**No. 156A.**—Soil, gray; subsoil, yellow; rolling highland; drainage, natural; oats field west of road; original timber, oak, chestnut; rotation: soy beans, meadow, oats; some manure and acid phosphate applied; swamp grass, sheep sorrel, broomsedge; red clover, poor.

**No. 157A.**—Soil, gray to yellow; subsoil, yellow; drainage, natural; rotation: corn, soy beans, wheat and clover; original timber, poplar, beech and sugar maple; crops good; manure, 2 applications; 400 lbs. 16% acid phosphate applied; red clover, very good.

**No. 158A.**—Soil, red to brown; subsoil, red; rolling highland; pasture field; weeds, briars, golden rod, wild grasses.

**No. 159A.**—Soil, gray; subsoil, yellow to gray; terrace; drainage, natural; corn field back of house; original timber, white oak, chestnut and sugar; not cropped for 20 years until 1916; crops fair; cowpeas and soy beans do well; red clover does well.

**No. 160A.**—Soil, dark brown; subsoil, brown; level; drainage, natural; corn field between house and railroad; rotation: corn, clover; manure on each corn crop; acid phosphate; alfalfa grown; red clover, does well.

**No. 161A.**—Soil, reddish brown; subsoil, reddish brown; level terrace; natural drainage; corn field west of railroad; cleared 100 years; original timber, sugar maple; corn for 25 years; crops good; red clover, fair.

**No. 162A.**—Soil, brown; subsoil, brown to yellow; level terrace; drainage, natural; field back of barn; cleared 100 years; original timber, sugar maple; crops good; some manure applied; alfalfa does well when limed.

**No. 163A.**—Soil, yellow to brown; subsoil, yellow; rolling terrace; drainage, natural; corn field northeast of hospital; original timber, oak and hickory; corn for several years; crops poor; red clover, none.

**No. 164A.**—Soil, dark brown; subsoil, brown; level overflow; drainage, natural; round bottom along river; cleared 100 years; original timber, black walnut, beech and sugar; rotation: corn, wheat, sweet clover; crops, good; red clover, very good.

**No. 165A.**—Soil, dark brown; subsoil, brown; level; 2nd terrace; drainage, natural; corn field along river; cleared 100 years; original timber, black walnut, beech and sugars; crops good; manure applied every three years; red clover fair.

**No. 166A.**—Soil, gray to brown; subsoil, gray; rolling highland; drainage, natural; corn field south east of barn; original timber, oak and chestnut; rotation: corn, corn, corn, wheat, clover, grass, grass; crops fair; manure applied to corn; red clover fair; plantain, principal weed.

**No. 167A.**—Soil, red to brown; subsoil, red to yellow; rolling highland; drainage, natural; field south of barn; cleared 75 years; original timber, white oak, sugar, poplar; rotation: corn, oats, wheat, grass; heavy application of manure; 250 lbs. acid phosphate; alfalfa does well; red clover does well.

**No. 168A.**—Soil, red to brown; subsoil, red to brown; level overflow; drainage, natural; alfalfa does well; potatoes, 1916; 200 lbs. acid phosphate applied per acre; one ton lime per acre; red clover does well.

**No. 169A.**—Soil, yellow to gray; subsoil, gray; rolling highland; drainage, natural; yields low; grass field southeast of road; some manure applied; red clover, none.

**No. 170A.**—Soil, dark brown; subsoil, dark brown; level terrace; drainage, natural; very fertile; original timber, oak, sugar, walnut, beech, locust.

**No. 171A.**—Soil, brown; subsoil, yellow; rolling highland; grass field above road; grass for many years; red top principal grass.

**No. 172A.**—Soil, dark brown; subsoil, dark brown; rolling highland; drainage, natural; alfalfa field west of pike; alfalfa for two years; 350 lbs. acid phosphate per acre; 1 ton limestone per acre; alfalfa good; crops, good.

**No. 173A.**—Soil, dark brown; subsoil, light brown; level terrace; drainage, natural; wheat field west of road in gravel bottom; red clover, none; crops fair.

**No. 174A.**—Soil, brown; subsoil, light brown; level terrace; drainage, natural; corn and soy bean field west of house; red clover, none.

**No. 175A.**—Soil, brown; subsoil, light brown; rolling highland; drainage natural; grass field west of road; rotation: corn, wheat, clover, grass; original timber, oak, sugars, chestnut; crops fair; red clover, fair; broomsedge and briars principal weeds.

**No. 176A.**—Soil, red to brown; subsoil, red to brown; level overflow; soy bean field west of railroad; original timber, sugars; corn until 1916; crops good; manure several times; red clover fair.

**No. 177A.**—Soil, gray to brown; subsoil, yellow; rolling terrace; drainage, natural; waste land in loops of fishing creek; original timber, walnut, locust, sycamore, poplar.

**No. 178A.**—Soil, gray; subsoil, light blue gray; rolling terrace; drainage, natural; pasture east of road; original timber, black walnut, sycamore; permanent pasture; blue grass and joint grass; red clover, none; broomsedge, briars, cinquefoil, principal weeds.

**No. 179A.**—Soil, chocolate brown; subsoil, chocolate; rolling highland; drainage, natural; grass field east of road; original timber, locust and hickory; old pasture; good orchard grass; red clover, fair.

**No. 180A.**—Soil, red brown; subsoil, chocolate; field west of road; original timber, oak; only cropped two years; potatoes and buckwheat; red clover, fair, on similar soil.

**No. 181A.**—Soil, brown; subsoil, light brown; level terrace; drainage, natural; corn field south of barn; cleared 75 years; original timber, oak, walnut and poplar; crops good; manure applied years previous (two); red clover, fair.



**No. 182A.**—Soil, brown; subsoil, brown; level overflow; drainage, natural; grass field west of railroad; original timber, walnut and wild cherry; grass two years, corn before; crops good; red clover, fair; broomsedge grows on land.

**No. 183A.**—Soil, gray brown; subsoil, yellow; grass field north of barn; cleared 100 years; original timber, oak, chestnut and locust; yield low; corn, grass for three years, largely orchard grass; some manure applied; red clover, fair.

**No. 184A.**—Soil, red brown; subsoil, red and yellow; rolling highland; pasture north of road; old pasture; good blue grass.

**No. 185A.**—Soil, light brown; subsoil, yellow; rolling highland; corn field back of barn; rotation: corn, (crimson clover); crops good; manure, 30 tons applied.

**No. 186A.**—Soil, brown; subsoil, light brown; level lowland; drainage, natural; corn field back of barn; cleared 75 years; 350 lbs. acid phosphate applied.

**No. 187A.**—Soil, reddish brown; subsoil, reddish yellow; rolling highland; drainage, natural; pasture above road; cleared 50 years; permanent pasture; bluegrass, principal grass.

**No. 190A.**—Hill field; cleared 15 years; original timber, chestnut and oak; soil, yellowish gray; subsoil, yellow; rolling highland; natural drainage good; crop rotation: corn, wheat, clover, timothy; corn yields 30 bushels, wheat 15 bu., hay 1½ tons; some manure applied to corn and wheat; 175 pounds acid phosphate applied; two tons ground limestone on part of field; clover only medium; principal weeds, cinquefoil, ragweed, running briar, broomsedge and sheep sorrel.

**No. 191A.**—Below lane to bridge; cleared over 100 years; soil, brownish yellow; subsoil, yellow; level terrace; good natural drainage; rotation: corn, wheat, meadow; corn yields 40 bushels, wheat 20 bushels and hay 1½ tons; 8 tons manure on corn; 250 pounds fertilizer on wheat; no lime; clover does well.

**No. 192A.**—Below barn; cleared 60 years; original timber, cedar, oak and pine; soil yellowish gray; subsoil yellow; rolling highland; good natural drainage; rotation: corn, wheat, clover, timothy; corn yields 40 bushels, wheat 20 bu. and hay 1½ tons; 4 to 5 tons manure every 3 or 4 years; no fertilizer or lime; clover does very well; typical limestone soil containing fragments of limestone rock.

**No. 193A.**—Upland field; cleared over 100 years; original timber, sugar, oak, black walnut and ash; soil yellowish gray; subsoil, yellow; rolling highland; good natural drainage; bluegrass sod; white clover present; red clover does well on this soil.

**No. 194A.**—Penniger place; cleared over 100 years; original timber, white oak, red oak and hickory; soil reddish brown; subsoil red; level bottom land; good natural drainage; rotation: corn, wheat, or rye, grass; corn yields 50 bu., wheat 20 bu., hay  $1\frac{1}{2}$  tons; 10 tons manure applied every 3 or 4 years; 200 pounds mixed fertilizer on wheat; 1 ton burned lime every 5 years; clover does well; typical bottom land; South Branch valley above Franklin.

**No. 195A.**—Saunder's field; cleared 60 years; original timber, oak, and white pine; soil, grayish white; subsoil, yellow; fairly level highland; natural drainage, fair; rotation: corn, wheat, grass; corn yields 25 bushels, wheat 18 bushels and hay  $\frac{3}{4}$  ton; 6 tons manure every 4 or 5 years; 200 pounds mixed fertilizer on wheat; cowpeas grown 2 years; clover does not do well; cinquefoil and sorrel principal weeds.

**No. 196A.**—North of barn; cleared 100 years; original timber, oak, pine; soil grayish white; subsoil, yellow; rolling highland; drainage natural, fairly good; rotation: corn, wheat, grass; corn yields 15 bushels, wheat 10 bushels, and hay  $\frac{1}{4}$  ton; very little manure applied; 200 pounds acid phosphate on wheat; no legumes grown; red clover very poor; poverty grass, cinquefoil, and briars principal weeds.

**No. 197A.**—Back field; cleared 100 years; original timber, oak, walnut and elm; soil, dark brown; subsoil, dark brown; level overflow; drainage, natural; rotation: clover, wheat, timothy; corn yields 75 bushels, wheat 20 bushels, hay, 2 tons; no manure, fertilizer or lime; red clover does fairly well; smart weed and morning glory principal weeds.

**No. 198A.**—Hill field cleared 100 years; original timber white oak; some walnut; soil, light brown; subsoil, brown; rolling highland; good natural drainage; rotation, corn, wheat, clover, timothy, timothy; corn yields 50 bushels, wheat, 15 bushels, hay 1 ton; 8 tons manure every 4 years; 200 pounds acid phosphate on wheat; no lime; clover does fairly well.

**No. 199A.**—South of barn; cleared 150 years; soil, dark brown to red; subsoil reddish brown; level highland; good natural drainage; corn grown continuously; yields good; no fertilizer, manure or lime; alfalfa and red clover do well; wild onion principal weed; soil derived from Beekmantown limestone and contains limestone fragments.

**No. 200A.**—Second field east of barn; cleared 10 years; original timber oak and walnut; soil, brown; subsoil, brown to red; rolling highland; good natural drainage; rotation: corn, wheat, clover; corn yields 35 bushels; 6 tons manure applied; 300 pounds acid phosphate applied 3 years previously; 3 tons quicklime applied 4 years previously; clover does well; soil derived from Chambersburg limestone.

**No. 201A.**—East of barn; cleared 65 years; original timber, oak; soil brownish black; subsoil, yellow to gray; rolling highland; drainage, natural; rotation: corn, wheat, clover, timothy; yields only medium; acid phosphate applied to wheat; limed 25 years ago; clover does only fair; black medic, sorrel and mustard principal weeds; gravelly soil derived from Martinsburg shale.

**No. 202A.**—East of barn, across run; original timber, oak and maple; soil, brown; subsoil, red to brown; rolling highland; good natural drainage; rotation: corn, wheat, clover; corn yields 50 bushels, wheat 15 to 20 bushels; some manure applied; 200 pounds acid phosphate every 3 years; 500 pounds quick lime applied 5 years ago; clover does fairly well; soil derived from Stone River limestone and contains fragments of the rock.

**No. 203A.**—Back field; original timber, oak; soil, red to brown; subsoil, red; rolling highland; good natural drainage; rotation: corn, wheat, clover; corn yields 30 bushels; 10 to 12 tons manure applied; 200 pounds acid phosphate applied; no lime; red clover does fairly well; soil derived from Beekmantown limestone which outcrops in ridges; soil contains fragments of lime rock.

**No. 204A.**—Field east of creek; soil, gray to black; subsoil, gray; level bottom land; good natural drainage; corn yields 80 bushels; manure applied to corn; no fertilizer or lime; this is a lime-marl deposit and is typical of soils formed from such material.

**No. 205A.**—South of road; original timber, oak, elm, locust; soil, brown; subsoil red to brown; rolling highland, good natural drainage; rotation: corn, wheat, clover, timothy; corn yields 50 bushels; some manure applied; 160 pounds fertilizer on wheat; clover does only fair; soil partially derived from Conoccocheate limestone; limestone outcrops, some shale and sandstone strata.

**No. 206A.**—Hill east of road; original timber, locust; soil, brown; subsoil, yellow to red; rolling highland; good natural drainage; virgin soil; sorrel, whitetop and poverty grass principal weeds; soil derived from Elbrook shales and limestones, brown to buff shale and gray limestone.

**No. 207A.**—Field above road; recently cleared; original timber, locust; soil, grayish brown; subsoil, red and brown mottled; rolling highland; good natural drainage; excellent corn land; some manure applied; 100 pounds .8-10-0 fertilizer applied; red clover does well; soil derived from Helderberg limestone, contains black flint fragments.

**No. 208A.**—Field across road from house; cleared 30 years; original timber oak and hickory; soil, gray to brown; subsoil, mottled red and yellow; good natural drainage, rolling highland; rotation: corn,

wheat, grass two or three years; 10 to 12 tons manure applied; 75 pounds fertilizer applied to corn and 250 pounds to wheat; 500 pounds burned lime applied 4 to 5 years ago; clover does well; raw weed and wild carrot principal weeds; soil derived from Roundout waterlime.

**No. 209A.**—Field east of road; original timber, oak; soil, brown; subsoil, brown to red; rolling highland; good natural drainage productive soil; derived from Waynesboro limestone; soil contains fragments of argillaceous shale, quartzite and limestone.

**No. 210A.**—West of barn; original timber, oak, pine and chestnut; soil, black to brown; subsoil, gray to brown; rolling highland; good natural drainage; rotation: corn, wheat, clover; heavy application of manure on corn; clover does not do well; sorrel principal weed; soil derived from Hamilton shales, in orchard section.

**No. 211A.**—Orchard; original timber, oak, hickory, locust; soil, brown; subsoil, yellowish brown; level highland; good natural drainage; potatoes grown continuously with rye cover crop seven years; potatoes yield 200 to 250 bushels per acre; 8 tons manure applied per acre; 1000 pounds fertilizer per year; no lime; no legumes grown; soil derived from Conoccocheate limestone.

**No. 212A.**—West of house; cleared 150 years; original timber, oak, hickory and locust; soil, brown; subsoil, yellow to brown; rolling highland; good natural drainage; corn, wheat, clover rotation; productive soil; manure applied to corn; some fertilizer applied; ground limestone applied five years ago; red clover does well; soil derived from Conoccocheate limestone.

**No. 213A.**—Corn field north of road; cleared 100 years; original timber, oak, hickory and locust; soil, brown; subsoil, brown; rolling highland; good natural drainage; virgin soil; corn yields 50 bushels on similar soil; clover does fairly well; derived from Elbrook shales with interbedded limestone and soft sandstone.

**No. 214A.**—East of ore track; original timber, locust; soil, bright red; subsoil, same; rolling highland, good natural drainage; virgin soil; makes fairly good soil when cropped; this is a deposit of iron ore which is being mined; strata of Tomstown limestone outcrop.

**No. 215A.**—East of road; cleared 150 years; original timber oak and pine; soil, gray; subsoil, yellowish gray; rolling highland; drainage, natural; unproductive soil, corn yields 15 bushels; no manure, fertilizer or lime; red clover does not do well; worn out land derived from Harpers shale.

**No. 216A.**—Field south of house; cleared 150 years; original timber, oak and locust; soil, brown; subsoil, brown; rolling highland, good

natural drainage; rotation, corn, wheat, clover, timothy, timothy, for 40 years; corn yields 40 bushels, wheat 18 bushels; manure applied on grass for corn; 200 pounds fertilizer on wheat; clover does not do very well; soil derived partially from Elbrook shales and partially from Waynesboro limestone.

**No. 217A.**—East of Summit Point road; old land; original timber, oak, locust and hickory; soil, brown to red; subsoil, same; rolling highland; good natural drainage; rotation, corn, wheat, clover, grass; productive soil; manure applied to corn; soil derived from Beekmantown limestone.

**No. 218A.**—Corn field across road from woods; original timber, oak, locust and hickory; soil, brown; subsoil yellow to brown; rolling highland; drainage, natural; rotation: corn, wheat, clover, grass; soil in good state of fertility; manure applied to corn; soil derived from Martinsburg shale.

**No. 219A.**—Hill above road; newly cleared land; original timber, locust and alanthus; soil, brown; subsoil, brown to red; rolling highland; good natural drainage; no rotation; 200 pounds acid phosphate applied; red clover does well; soil derived from Helderberg limestone, just below Oriskany sandstone; contains flint pebbles.

**No. 220A.**—Field above house; original timber, oak, locust; soil, brown; subsoil, brown to yellow; rolling highland; good natural drainage; truck patch; yields low; some manure and fertilizer applied; no lime applied; red clover does fairly well; garlic and plantain principal weeds; soil derived from mixture of materials from Oriskany sandstone and Bossardsville limestone; contains fragments of flint, shales and sandstones.

**No. 221A.**—Above road to Cacapon; original timber, oak, hickory, chestnut and maple; soil, brown to chocolate; subsoil, yellow to brown; rolling highland; drainage, natural; poor barren shale soil; derived from red to green shales of Niagara formation.

**No. 222A.**—On top of hill on road to Cacapon; original timber largely sassafras, some oak and chestnut; soil, brown; subsoil, yellow; rolling highland; drainage, natural; peach and apple orchard; yields of crops on similar soil very low; no fertilizer, lime or manure; sorrel and wild strawberry principal weeds; soils derived from Clinton sands and shales; soil contains blocks of red to gray sandstone and some shale.

**No. 223A.**—Bottom near Sir John's Run; soil, brown; subsoil, brown; level terrace; drainage, natural; no rotation, one piece in corn 35 years; fairly good soil; too wet for clover to do well; this is at the base of the Niagara sandstone and represents considerable soil along the Potomac.

**No. 224A.**—South of road to Spohr's Cross Roads; original timber, oak, locust and hickory; soil, brown; subsoil, buff to red; rolling highland; drainage, natural; rotation: wheat, orchard grass, corn, tomatoes; production low; no manure or lime, probably some fertilizer; clover does not do well; representative of large area of shale soils derived from buff to chocolate red Chemung shales, some blocks of sandstone.

**No. 225A.**—North of road to Spohr's Cross Roads; soil, brown to reddish; subsoil, brown to red; rolling highland; drainage, natural; low fertility; some lime applied; derived from Porters shales and sandstones; pieces of conglomerate, sandstone and shale.

**No. 226A.**—Fulton Orchard Mill Farm; soil, brown; subsoil, brown; level bottom land; drainage, natural; apple orchard seeded to crimson clover; no manure, lime or fertilizer; red clover does not do well; heavy growth of sorrel; soil derived from sandstone and shale material.

**No. 227A.**—North of road; soil, brown to black; subsoil, same; rolling highland, good natural drainage; rotation: corn, tomatoes, wheat, grass; yields extremely low; no manure, fertilizer or lime; red clover does not do well; too poor to grow weeds; thin black slate soil derived from Marcellus shale.

**No. 228A.**—Below Baltimore and Ohio R. R. tracks; soil, brown; subsoil, brown; poor natural drainage; field in rye; yields fair; no treatment; red clover does not do well; silt from shales of Hamilton formation, representative of much land along Potomac.

**No. 229A.**—South of road; soil, red; subsoil, red; rolling highland; good natural drainage; corn field, peach orchard pulled last year; no treatment; derived from red sandstones and shales of Catskill formation.

**No. 230A.**—On top of ridge; original timber, oak and pine; soil, chocolate; subsoil, chocolate; rolling highland; good natural drainage; no rotation; no treatment; soil derived from red sandstone; low fertility.

**No. 231A.**—Wheat field north of house; cleared many years; original timber, oak and hickory; soil, chocolate to red; subsoil, chocolate; level terrace; drainage, natural; rotation: corn, wheat, clover; yields only medium; manure applied to wheat and corn; 200 pounds of acid phosphate applied to corn and wheat; no lime; red clover does not do well; derived from red sandstone.

**No. 232A.**—Wheat field north of orchard; cleared many years; original timber, oak and hickory; soil, gray; subsoil, gray; rolling highland; drainage, natural; rotation: corn, wheat, clover; yields fair; manure applied to corn and wheat; 200 pounds acid phosphate on corn and wheat; clover does not do well unless limed; soil derived from shales and sandstones.

**No. 233A.**—Soil, black; subsoil, gray; muck soil; natural drainage poor; open ditches; good corn when not too wet; red clover does not do well; top soil only 4 to 6 inches deep; soil difficult to work.

**No. 234A.**—Sand field against hill; soil gray to yellow; subsoil, yellow; rolling highland; natural drainage fair; no treatment; crop yields low; red clover does not do well.

**No. 235A.**—Oatfield below hill; soil, gray; subsoil, yellow; rolling terrace underdrained with cement drain tile; yields better than on previous sample; some manure applied this year.

**No. 236A.**—Corn field in bottom; soil, gray to black; subsoil, gray; level terrace; underdrained with cement drain tile; productive soil; representative of large area of level land in this section.

**No. 237A.**—Back and to the right of barn; cleared 17 years; original timber, oak and hickory; soil, brown; subsurface brown; subsoil gray; level terrace; natural drainage poor, installing tile drains; rotation: corn, wheat, grass; crop yields good when not too wet; manure applied to corn; 200 pounds of acid phosphate applied to wheat; no lime; red clover does not do well.

**No. 238A.**—Field next to road and railroad; soil, chocolate brown; subsoil, brown to red; level terrace; natural drainage poor, tile on most of farm but not in this field; rotation, corn, wheat, clover; yields very good on drained land; no treatment; red clover does fairly well.

## INTERPRETATION OF ANALYSES

Of more than eighty known chemical elements, ten are essential to the growth of plants. Of these there are three, nitrogen, phosphorus, and potassium, which may be present in available form in such small amounts in the soil as to limit the growth of crops. The analyses presented in this bulletin show the total amounts of these elements present in the soils, but do not show what proportion of each element is present in an available form. Two factors largely determine the amount of available plant food in the soil:

1. The total amount of the elements present in the soil.
2. The rate at which organic matter is decaying in the soil. The rate of decay is to a considerable extent influenced by:

1. The amount and composition of the organic matter present.
2. The extent to which the soil is kept supplied with carbonate of lime.

Soil building is a slow process compared with the rate at which a soil may be ruined in a poor system of farming. A permanent sys-

tem of soil improvement and soil maintenance requires that we plan for years in advance. It is in planning for such a system that the analysis of a soil is of most value, representing as it does an inventory of the soil's total capital of plant food, organic matter, and carbonate of lime.

It is difficult to judge from the analysis of a single soil how it ranks in immediate fertility or what treatments it should properly receive. More can be told by comparing its analysis with the average for the soils of the state, or still better, with the analyses of other soils of the same type or series.

The following table gives the average analysis of the 240 soils of the state so far analyzed, together with the highest and lowest amounts of each element found in any soil and for purposes of comparison the analysis of the untreated soil from the West Virginia Experiment Station farm. The amount of organic matter is calculated by multiplying the total carbon by 1.724 which would mean that organic matter was 58% carbon. The limestone requirement indicates the number of pounds of limestone necessary to destroy all the acid in the surface soil to plow depth. For most crops it is desirable to have the soil well supplied with limestone.

TABLE IV.—Pounds per 2,000,000 pounds of Surface Soil

	Nitrogen	Phosphorus	Potassium	Organic Matter	Limestone Requirement
Highest -----	10794	3636	160,200	302,800	6800
Lowest -----	874	275	1,200	14,750	0
Plot 21, Exp. Sta. Farm-----	1830	590	24,200	36,500	2800
Average of all soils -----	2955	1103	28,234	57,700	1953

A study of the analyses of these soils shows that many of them are seriously depleted in phosphorus, nitrogen and organic matter. Eighty-one percent of the soils so far analyzed show a need of lime. Most of the soils are well supplied with potassium.

We prefer to wait until the principal soil types from all counties in the state have been analyzed before discussing these results in detail. Table IV shows, however, that the average West Virginia soil so far analyzed is better than that of the Experiment Station farm. On the other hand, a careful study of the analyses presented in this bulletin will show that many of the soils of the state would probably respond to fertilizer treatment much the same as does the soil of the Experiment Station farm.\*

\* See "Experiment with Fertilizers", Bulletin 155, West Virginia Agricultural Experiment Station.





